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**Cosmetic composition based on partially neutralized,
water-soluble unpolymerized or relatively unpolymerized
organosilicon compounds**

grat 5 The present invention relates generally to aqueous cosmetic compositions, in particular for treating the hair, comprising unpolymerized or relatively unpolymerized water-soluble organosilicon compounds.

10 It is common practice to use organic compounds such as polymers to produce cosmetic compositions for treating the hair. For example, polymers that, on drying, give solid materials are used to fix the hairstyle in a shape. Such materials are also used to give shape holding effects. Polymer compounds, such as polysiloxanes, are also used to give care effects to hair, particularly hair that is damaged or difficult to disentangle. The cosmetic compositions containing these polymers are applied to the hair, which is left to dry or is rinsed before proceeding 15 to the drying step.

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The use of polymer compounds presents several drawbacks.

25 The first drawback lies in the fact that, when the polymers are used in compositions beyond a certain concentration, the compositions obtained are difficult to apply due to the increase in the viscosity of the composition. This difficulty in applying the compositions results in the hair being overloaded in certain areas and 30 thus leads to cosmetic defects, and also means that certain parts of the hair receive less of the compositions, which, in the end, induces a lessened effect on these parts.

35 The second drawback lies in the fact that these compositions are occasionally difficult to use. The reason for this is that polymer compounds with a low water solubility require the use of an organic solvent or

a mixture of organic solvents. The use of organic solvent entails several problems, such as environmental problems and problems of the effect on the cosmetic quality of the hair.

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To overcome these drawbacks, attention has thus turned toward the use of polymer compounds that have been rendered partially water-soluble. Thus, certain polymer compounds may be used in water without adding any 10 cosolvent. In this case, the limitation lies in the fact that these polymer compounds are partially, or even totally, removed by rinsing the hair. Consequently, in this case, the effect due to the polymer compounds is very limited after rinsing. Ultimately, this limits the 15 effect of rinse-out treatments (shampooing or conditioning), but also reduces the advantage of such compositions used in leave-in mode (lacquers, mousses, hairsetting lotions, etc.) since the user loses the effect acquired by the treatment when he washes his hair.

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Efforts have thus been made to find compounds or formulate cosmetic compositions that may be used in water and that show remanence of their effect when the hair is rinsed.

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Thus, US patent No 4 344 763 (Gillette) describes cosmetic compositions comprising an organosiloxane monomer such as an aminoalkylalkoxysilane and an organic titanate dissolved in an alcohol.

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More specifically, said patent describes a process for shaping the hair, which consists in wetting it with water and then applying a solution containing, in isopropanol, from 0.5% to 15% by weight of an aminoalkylalkoxysilane and from 0.005% to 1.5% by weight of an organic titanate, and then in placing the hair in the desired shape.

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According to this process, it is particularly recommended to keep the isopropanol solution protected against any moisture.

- 5 The document "Nouveaux types de fixateurs pour cheveux ayant des propriétés semi-permanentes [Novel types of hair fixing agents with semi-permanent-waving properties]", M. SARDO - Parfum Cosmétique Saveur France, Vol. 2, No 5 (1972) also describes compositions of this
10 type.

Most of the products are not effective, since the aqueous compositions produced are unstable.

- 15 Patent EP-113 992 also discloses a process for simultaneously fixing and conditioning the hair using a composition, which is stable in the absence of moisture, containing (A) a siloxane oligomer containing at least one nitrogen-hydrogen bond, and (B) a readily hydrolyzable anhydrous additive chosen from titanates, zirconates, vanadates and germanates, and mixtures thereof.
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25 The solvent for the composition is an aliphatic hydrocarbon or an aliphatic halohydrocarbon, preferably 1,1,1-trichloroethane.

30 After applying the composition to the hair, the hair is placed in a humid atmosphere in order to bring about the crosslinking of the siloxane oligomer and the readily hydrolyzable anhydrous additive.

35 There is thus a need for a stable cosmetic composition, in particular for treating the hair, which is essentially aqueous and which makes it possible to obtain a sufficient cosmetic effect, in particular for the hair, in rinse-out or leave-in mode.

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One subject of the present invention is thus stable aqueous cosmetic compositions, in particular cosmetic hair treatment and haircare compositions, which overcome the drawbacks of the prior art.

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More specifically, one subject of the present invention is stable aqueous cosmetic hair treatment and haircare compositions that give the hair a long-lasting styling effect and a pleasant feel.

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The Applicant has found, surprisingly, that it is possible to formulate cosmetic compositions that do not require the use of an organic solvent and that have an effective, rinse-resistant effect, without the risk of problems of loaded hair in the event of superposition, by using in these compositions unpolymerized or relatively unpolymerized, water-soluble organosilicon compounds comprising at least one basic chemical function and partially neutralized with specific agents.

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It has been found that applying such compositions produces pronounced cosmetic effects, with no problems in the event of superposition, whose effects withstand rinsing and washing.

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According to the invention, the cosmetic compositions, in particular for treating the hair, comprise, in a cosmetically acceptable aqueous medium, at least 0.05% by weight, relative to the total weight of the composition, 30 of one or more unpolymerized or relatively unpolymerized water-soluble organosilicon compounds chosen from organosilanes comprising one silicon atom and organosiloxanes comprising two or three silicon atoms, the organosilicon compounds also comprising at least one basic chemical function and at least two hydrolyzable or hydroxyl groups per molecule, characterized in that it comprises an amount of a neutralizing agent chosen from sulfuric acid, sulfuric acid salts and mixtures thereof,

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such that the unpolymerized or relatively unpolymerized organosilicon compounds are neutralized to a proportion of 1/1000 to 99/100 and preferably from 1/100 to 8/10.

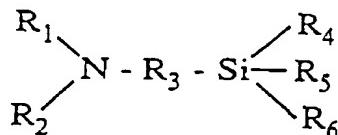
- 5 The organosilicon compounds according to the invention are capable of forming, in aqueous medium, a non-hybrid compound, after self-condensation and evaporation of the support. The expression "non-hybrid compound" means a compound that is chemically homogeneous with regard to
10 silicon, that is to say that it contains no other additional metallic or organometallic species.

The unpolymerized or relatively unpolymerized organosilicon compounds that are useful in compositions of the present invention are chosen from water-soluble organosilanes comprising one silicon atom and water-soluble organosiloxanes comprising two or three silicon atoms, preferably two silicon atoms. They must also comprise at least one basic chemical function, and
15 preferably only one basic chemical function. The basic chemical function may be any function that gives the silicon compound a basic nature without harming its solubility in water and is preferably an amine function such as a primary, secondary or tertiary amine function.
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25 The basic chemical function of the silicon compounds according to the invention may optionally comprise other functions such as, for example, another amine function, an acid function or a halogen function.

30 The organosilicon compounds that are useful in the compositions of the present invention also comprise at least two hydrolyzable or hydroxyl groups per silicon atom. The hydrolyzable groups are preferably alkoxy, aryloxy or halogen groups. They may also optionally
35 comprise other chemical functions such as acid or amine functions.

The organosilanes that are preferred according to the invention correspond to the formula:

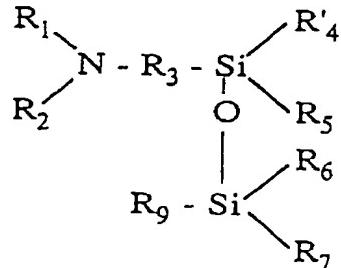


in which:

- 5 R_4 represents a halogen or a group OR' or R'_1 ;
 R_5 represents a halogen or a group OR'' or R'_2 ;
 R_6 represents a halogen or a group OR''' or R'_3 ;
 and R_1 , R_2 , R_3 , R' , R'' , R''' , R'_1 , R'_2 and R'_3
 10 represent, independently of each other, a saturated or
 unsaturated, linear or branched hydrocarbon-based group
 optionally bearing additional chemical groups such as
 acid or amine groups, R_1 , R_2 , R' , R'' and R''' also
 possibly denoting hydrogen, and
 at least two of the groups R_4 , R_5 and R_6 being other
 15 than groups R'_1 , R'_2 and R'_3 .

20 Preferably, R_1 , R_2 , R_3 , R' , R'' and R''' , R'_1 , R'_2 and R'_3
 represent a C_1 to C_{12} alkyl group, a C_5 to C_{14} aryl group,
 a (C_1 to C_8)alkyl(C_5 to C_{14})aryl group and a (C_5 to
 C_{14})aryl(C_1 to C_8)alkyl group; and R_3 is preferably a C_1 to
 C_{12} alkyl group, a C_5 to C_{14} aryl group, a (C_1 to
 C_8)alkyl(C_5 to C_{14})aryl group and a (C_5 to C_{14})aryl(C_1 to
 C_8)alkyl group.

- 25 The organosiloxanes that are preferred in the compositions of the present invention may be represented by the formula:



in which:

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R₁, R₂, R₃, R₅ and R₆ are defined as above;

R'₄ represents a halogen or a group OR₁₁;

R₇ represents a halogen or a group OR₁₀ or R''₁;

R₉ represents a halogen or a group OR₈, R''₂ or

5 R₃NR₁R₂;

R''₁, R''₂, R₈, R₁₀ and R₁₁ represent a saturated or unsaturated, linear or branched hydrocarbon-based group optionally bearing additional chemical groups such as basic solubilizing groups;

10 R₁₁, R₁₀ and R₈ also possibly denoting hydrogen.

Preferably, R''₁, R''₂, R₈ or R₁₀ and R₁₁ represent a C₁ to C₁₂ alkyl group, a C₅ to C₁₄ aryl group, a (C₁ to C₈)alkyl(C₅ to C₁₄)aryl group and a (C₅ to C₁₄)aryl(C₁ to C₈)alkyl group.

At least one of the groups R₆, R₇ and R₉ denotes a halogen or a group OR'', OR₁₀ or OR₈.

20 Preferably, the halogen is chlorine.

One important aspect of the compositions of the invention is that the unpolymerized or relatively unpolymerized organosilicon compounds are partially neutralized with 25 the aid of a neutralizing agent or a pH regulator chosen from sulfuric acid, sulfuric acid salts and mixtures thereof, such that the neutralization reaches 1/1000 to 99/100 and better still from 1/100 to 8/10.

30 The sulfuric acid salts are preferably alkali metal sulfates, in particular sodium sulfate, and ammonium sulfate.

35 This partial neutralization of the unpolymerized or relatively unpolymerized organosilicon compounds of the compositions of the invention takes on an important aspect as regards obtaining the desired properties for the compositions.

Another important aspect of the compositions according to the invention is that the organosilicon compounds, the pH regulators and also the other constituents of the composition are chosen such that this composition contains large amounts of unpolymerized or relatively unpolymerized organosilicon compounds, that is to say that they comprise one, two or three silicon atoms. Thus, it is necessary for the composition to contain, relative to the total weight of the composition, at least 0.05% of unpolymerized or relatively unpolymerized organosilicon compounds, and preferably at least 0.5% and possibly ranging up to 50% by weight.

The content of the unpolymerized or relatively unpolymerized organosilicon compounds according to the invention is determined by the usual analytical methods such as silicon-29 and proton NMR spectroscopy, and by chromatography.

The compositions according to the invention are aqueous compositions. However, it is possible, for example for the use of adjuvants, to add a cosolvent such as an alcohol or a ketone, for example ethyl alcohol or acetone.

In a known manner, all the compositions of the invention may contain adjuvants that are common in cosmetics, such as oils, waxes or other common fatty substances; standard gelling agents and/or thickeners; emulsifiers; moisturizers; emollients, sunscreens; hydrophilic or lipophilic active agents such as ceramides; free-radical scavengers; surfactants; polymers; proteins; bactericides; sequestering agents; antidandruff agents; antioxidants; preserving agents; fragrances; fillers; dyestuffs.

The amounts of these various adjuvants are those conventionally used in the field under consideration.

Needless to say, a person skilled in the art will take care to select the optional compound(s) added to the composition according to the invention, such that the advantageous properties intrinsically associated with the composition in accordance with the invention are not, or are not substantially, adversely affected by the envisaged addition.

The compositions according to the invention may be used in rinse-out or leave-in mode.

The compositions according to the invention may be in any form that is suitable for topical application, especially in the form of solutions of the lotion or serum type; in the form of aqueous gels; in the form of emulsions obtained by dispersing a fatty phase in an aqueous phase (O/W) or, conversely, (W/O), of more or less thickened liquid consistency such as more or less unctuous milks and creams.

These compositions are prepared according to the usual methods.

The compositions according to the invention are preferably used as hair products, especially for holding the hairstyle or for shaping the hair. They may also give the hair a temporary coloration, or may protect the hair against the effects of UV radiation, while at the same time providing properties of holding or fixing the hair.

The hair compositions according to the invention are preferably styling products such as hairsetting gels or lotions, blow-drying lotions and fixing and styling compositions such as lacquers or sprays.

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The lotions may be packaged in various forms, especially in vaporizers, in pump-dispenser bottles or in aerosol containers to provide an application of the composition in vaporized form or in the form of a mousse. Such 5 packaging forms are indicated, for example, when it is desired to obtain a spray or mousse for fixing or treating the hair.

A subject of the present invention is also the use of the 10 composition according to the invention in a process for treating the hair, in order to hold and/or colour it.

According to one embodiment of this process, the 15 composition is applied to rinsed or unrinsed hair, preferably in the form of a spray, either using a pump-dispenser bottle or using an aerosol.

After spraying over the head of hair, the composition is left to act and to dry. 20

The hair may be rinsed after the composition has been applied.

The hair may be placed in the desired shape, either 25 before the application or immediately after.

The drying time may be variable and depends on the nature of the composition.

30 After combing, the hair has a very pleasant feel quality.

The invention is illustrated by the examples which follow:

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EXAMPLE 1

The four formulations below were prepared:

<u>Compo-</u> <u>sitions</u>	<u>Unpolymerized or rela-</u> <u>tively unpolymerized</u> <u>water-soluble silicon</u> <u>compound</u>	<u>Neutralizing</u> <u>agent</u>	<u>Water</u>
	Aminopropyltriethoxy- silane (g per 100 g of composition)	Amount of neutral- ization (normality) relative to the amount of soluble silane 0.5	
1	12 g	Hydrochloric acid	qs 100 g
2	12 g	Sulfuric acid	qs 100 g

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After applying the compositions to the hair and drying, compositions 1 and 2 lead to films having the following characteristics:

Composition 1: homogeneous, transparent, supple,
10 nonbrittle film.

Composition 2: homogeneous, transparent, very
rigid, brittle film.

Homogeneous, rigid, brittle films are needed in order to
15 obtain good cosmetic effects.